

University of Groningen

## Synthesis and Application of Thermally Reversible Polymeric Networks from Vegetable Oils

Yuliati, Frita

DOI:  
[10.33612/diss.127911343](https://doi.org/10.33612/diss.127911343)

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2020

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Yuliati, F. (2020). *Synthesis and Application of Thermally Reversible Polymeric Networks from Vegetable Oils*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.  
<https://doi.org/10.33612/diss.127911343>

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

# Acknowledgements

Alhamdulillah... I am very grateful that this journey is almost finished! Finishing a PhD is a great adventure full of scientific and mostly life lessons, creating sweet and precious memories as well as friendships. I would like to express my gratitude to everyone who supported me along the way.

First, I would like to thank Prof. Hero Jan Heeres for giving me the opportunity to be a PhD student in your group. I will never forget the first interview via the Skype call that didn't go well because of a bad internet connection. However, we met in Jakarta later and I was very much impressed by the conversation we had. Thank you for your guidance and also the encouragement to attend your group meetings, I learned a lot from them.

My greatest gratitude to Prof. Francesco Picchioni for guiding my research along this journey. It has not been only about science, it's also about life, friendship, freedom, and patience. Thank you for giving me the freedom to learn in my own way while keeping me on track. And thank you for making me feel better after our meetings, those gave me energy to go on with the work.

I would like to thank my reading committee, Prof. Jun Yue, Prof. Paolo Pescarmona, and Prof. Maria Letizia Focarete, for spending their precious time to read and give valuable suggestions to improve my manuscript.

My gratitude goes to the Riset Pro scholarship committee, for supporting my study in Groningen, and special thanks to Pak Ibnu and Pak Bagus for their clear and convenient communication. Also to Pusbindiklat BPPT, especially mbak Maya and mbak Indra.

Thank you Tim Zwaagstra for helping me during admission to the university and our communication until this last phase of my PhD.

Moreover, I would like to thank Peter Deuss for our discussions during the group meetings and in writing my second chapter. Thank you, Ranjita Bose for your help on my third and fourth chapters, as well as the nice interactions outside work topics. I'm happy to see a woman on an academic position in our department, and I'm glad that it's you!

My thanks to Marya de Jonge, our former secretary, for giving me two options of desks on my first day at the university, all her help, and our nice conversations. Also to our new secretaries, Geraldine Gambier and Kim Winters, for their help with administrative matters.

Laboratory work is impossible to perform alone, there was a huge help from the analytical and technical department. A special thanks to Léon Rohrbach for his help with instruments and our work together keeping Lab 256 clean and tidy, also to his intern students including Thomas Ruzius, Lintang, and Ridho. Thank you Jan Henk Marsman for our discussions. Also thanks to Marcel de Vries, Anne Apeldoorn, and Erwin Wilbers, for all the help with the technical matters from drilling vial caps to dealing with broken fume hoods. Thank you and the secretaries for the Labuitje's and Christmas lunch and dinners, they were always memorable.

I would also thank Pieter van der Meulen of the NMR lab, Johan Kuiper the Gas Man, everyone in the logistics department, and especially to Klaas for his enormous help with filling the liquid nitrogen dewar while Johan was away.

During the PhD research, I was very lucky to share the journey with some students. Mart van Schooten, Declan O'Donovan, Jennifer Hong, Keshia Indriadi, and Julia van Harten, thank you for everything. I learned so much from you about science, project management, and culture. Special thanks to Julia for all your work with the research, being a member of our office room, your translation of my thesis summaries, and most of all, your friendship.

Some of my experiments required chemicals that are not available in the market. Luckily, there were some leftovers in the lab. Thank you Laurens Polgar and Robin Cerpentier for the leftover bismaleimides, they really saved me a lot of time.

And speaking of time, last experiments had to be done during my last months in Groningen. Due to the limited time, help can be essential in finishing the work. Thank you Alexander Zdvizhkov, for modifying the silica filler for my last experiment, also for performing another experiment when I was already back to Indonesia. Your help was priceless.

Discussion among researchers is important to enrich the knowledge and perform better research. I would like to thank Felipe Orozco-Gutierrez for initiating the talks on side reactions and isomerization related to the Diels-Alder, which in the end rescued me by giving an idea on a possible answer to an unexplained trend in my results.

My memorable experience in the lab was also made by interacting with my former lab mates. We worked together everyday doing experiments, shared glass wares and other lab stuffs, cleaned up the lab, told jokes, and helped one another. Thank you Zhiwen Wang, Zhenlei Zhang, Ciaran Lahive, and Inouk Muizebelt.

My journey will never be the same without everyone in the Product Technology Group. Thank you everyone for the nice interactions everyday in the lab and in the group meetings. Thank you Patrizio Raffa for your lecture where I sat in, Ionela Gavrila for letting me bother you while I talked to your office mates every morning, Yifei Fan for all your help in lab 210, Nicola Migliore for all your help finding things in the lab and the discussions, Martine Schouten-Hoogendijk for your help with DMA, Afshin Dianatdar for the beautiful scarf, Cynthia Herder for the nice conversations on the writing days, Frank van Mastrigt for your help on my first day at the university, Rodrigo Araya Hermosilla for your suggestion on collaboration, Khaled Sebakhy for the paper, also thanks to Esteban Araya Hermosilla, Guilherme Lima, Shun Fang, Daniele Chinello, Zhenchen Tang, Dina Boer, Zeynab Masoumi, Pablo Druetta, Arjen Kamphuis, Nihat Sahin, and Martijn Beljaars.

I was lucky to be in two research groups, thus there were more people to meet and more knowledge to tap during the group meetings. Thank you everyone in the Green Chemical Reaction Engineering Group, Arjan Kloekhorst for your explanation on 2D NMR, Lorena Falco for the cooking lesson, Homer Genuino for the conversations, Jessi Osorio Velasco for the cat posts, Arne Hommes for being a nice co-paranymph, Tim Meinds, Douwe Zijlstra, Shilpa Agarwal, Yin Wang, Songbo He, Xi X, Savitha Sundaraiah, and Ramesh Chowdary. A special thanks to Henk van de Bovenkamp for the nice conversations and the plant tour in BioBTX.

Besides all the help in the scientific part of the journey, there is another kind of support that helped me to go on day by day. My gratitude to the Indonesians in our department, who supported me not only in scientific work, but also in life's practical matters and as an emotional support system. Thank you Angela Kumalaputri for your practical tips to cope with life in Groningen. Prima Kristijarti, for being the wise big sister who helped me to be grateful even in the difficult days. Susanti, for sharing your views, experiences, and suggestions. Miftahul Ilmi, for introducing me to new people and activities. Henky Muljana, for your wise advice, especially when I felt I was in trouble; also for your suggestions on my manuscript. Dian Santosa, for listening to my stupid stories. Louis Daniel, for your technical advices. Yusuf Abduh, for being an inspiration. Boy Fachri, for

the brief but colorful interaction, Arlina Putri for all your help, and Ria Abdilla, for your precious help at the first and the last steps of my PhD.

As a standard Indonesian, I love to smile and laugh, but apparently these habits can make misunderstanding in the Netherlands. Fortunately I found someone to exchange friendly hello and laughter with, every morning in my first two years in Groningen. Thank you Harry Bosscher, it wouldn't be the same without you.

Sitting in an office of six people can be just a dull situation with shallow interactions. However, I was lucky to find friends in my office mates. Most of the time we needed to be silent but we also interacted nicely. We invited one another for dinner and had a picnic together, I will cherish all the moments we shared. Special thanks to Cui Ouyang who brought our office into life, with her lively personality and ideas for activities. Thank you Bhawan Singh Bist, Wenze Guo (and Yingying), Jue Wang (and Xing Wang), Guiseppe Bagnato, and Tuhin Chatterjee (and Enakshi). Also thanks to my "illegal" office mates who shouldn't be there but I'm happy you were: Caelan Randolph, Rob van der Wal, and Thijn Kortenbach.

Differences can make it difficult for some people like me to make close friends, be it difference in culture, age, gender, and so on. Therefore, having some female colleagues from culturally rather-similar backgrounds can be a great help. Thank you ladies, for being nice friends as well as fashion references. Thank you Xiang Tang for the dinner invitations. Thank you Li He, Yanyan Liu, and Jing Li for the lasting communications, Yehan Tao for the interesting story once in a dinner, and Jing Chen, we shared an interesting story indeed. Thank you Masoumeh Taherimehr and Fatemeh Ahangaran, we met only in a few months but the friendship last much longer.

Nearing the end of my time in Groningen, more sweet memories were written. Thank you Zahra Asgar Pour, for being an inspiration for your hard work, for your willingness to be my paranymp, and sorry things didn't go as planned. Also thanks Yasser Alassmy, for your willingness to help. And thank you Balaji Sridharan for the farewell dinner.

In the search of a non scientific experience, I joined the GSSE PhD Council. It was a precious experience and also an honor to be involved in efforts to improve the quality of PhD program in our graduate school. Thank you to my colleagues in the council: Maryam Chaib de Mares, Marijke Beulen, Zsofia Buttel, Daniel Balazs, Olivier Grasdijk, Sabrina Koch, Yvonne Kahlert, Christian Leutenantsmeyer, Vincent Le Corre, Carmem Gilardano,

and Monique Bernardes Figueirêdo (I knew you'd be great!). This activity enabled me to interact more closely with the Graduate School. My special thanks to Marco Koopman for the nice experience working together, and Prof. Petra Rudolf, for being an inspiration.

Back to my early months in Groningen, I learned to make friends with non-Indonesians. It's just awesome that we still keep supporting each other, Cecilia Lara Martinez, I hope this beautiful friendship lasts forever. Also thanks to Bhagwati Jainapunkar and Javier Maldonado, for everything!

Sometimes we find friends in unexpected ways, and I'm happy our paths crossed. Thank you Inge Krabbendam, Leonie Brummer, and Gerda van der Veer for your support, hopefully we will meet again.

A special remark for Fiona van der Marel, who taught me to play flute and helped me fill my last months in Groningen with the beauty of music.

Last but not least, I would like to thank the Indonesian community who helped me adapt to the new life. Thanks to the Kajuit family: Monik & Fajar, Pak Taufik & Tina, Rully & Intan, Hegar & Ica, Lusi, and Resti, for being my first community in Groningen. Thanks to the Plutolaan community: Arya, Malvino, Esmi, and especially Eka Putri for taking care of the three of us. Thanks to Fadiah, your lessons were truly a blessing. Thanks to Rosel and Mas Didik for taking care of Muti after school, to mbak Suwatin for being an inspiration, to umi Fitri, mas Kuswanto, Idang, Piya, & Enzo, for becoming a sturdy support system and an emotional shelter for me and Muti, to Laras for being a good friend of me and Muti, to Aryan for the entertaining cat discussions to Inda for the lovely times, to mbak Laksmi & mas Kadek, for your kindness to mimi Ayu & Zainal, and Arum & Lana for taking care of Muti, to mbak Afifah, thank you and sorry, to mbak Putri for taking me refuge on Tuesday evenings, to Rani for the nice talks, to ibu Rini & pak Asmoro the ones that we look up to. Thanks to the PPIG and deGroemiest community: pak Tatang & bu Rohmah, mas Bino, Nuri & Adyat, mbak Uci & mas Joko, Anis & Didin, Nadia & Zakki, Amalina & Azis, mas Amak, Inna & Agung, mbak Erna & mas Buyung, Irma & Mega, Sella & Zaky, mbak Elfride Irawati, mbak Ira, Steven, Yoga, Nia, mbak Inung, Nuril, Yassaroh, Gina, Guntur, Desti, Afif, Alfian, Endira, Cancan, Daulika, Reni, Akbar, Riswandy, and Ferro.

Thank you tante Harna for being the motherly figure in Groningen, you will always be in my heart. Thank you oom Tony, and hopefully you're resting in peace. Thank you tante Titie and oom Bert for letting me stay in your house and taught me a lot of things. Thank

you tante Indah and oom Yon, it was always peaceful talking to you. Thank you tante Arie & oom Herman, for the warmth you always shared. Thank you bu Elvira for your help with the snacks and dancing costume. And thank you bude Nunung for all your help.

The last 10 months in Groningen was the toughest, I tried to finish everything while my family was already back to Indonesia. But I am grateful for finding a new home that rescued me from loneliness with their acceptance. Thank you Ica, Krisna, Rayyan, Koen, Bagus, and Javier for being my second family. I definitely miss the time we spent together, cooking, having dinner, playing monsters, major cleaning up, watching TV, and travelling. Thanks to the PL125 extended family : Liany, Renren, Salva, Dina, Maysitha, Caecilia, Sugab, and Bella.

And even after I returned to Indonesia, supports are still pouring in finishing my thesis. Thank you ibu Erny Soekotjo for giving me time to finish what I started. Thank you everyone at Balai Teknologi Polimer BPPT for your support and understanding.

To my paranymphs, Ali Syari'ati and Qingqing Yuan, thank you so much for helping me. It can be a lot of work and a bit confusing because I'm not in Groningen, and I am grateful that you are willing to do it.

And to my beloved family... I was so eager to jump into this adventure and made you sacrifice for me. I can't thank you enough.. To my mother, mama Rukmini, thank you for all your love, support, and prayers. To my father, papa Imam Wahjudi, seems like one of your plans for me worked! To my husband, Hanudiyana Salindratmo, thank you for your encouragement to believe in myself, to dream and reach for it, alhamdulillah we survived this madness! And to my daughter Muthiaffa Salta Annisa, thank you for giving me a reason to go on, and being such a beautiful child during our adventures together. To my parents in law ibu Sri Wuryaningsih, I hope you're at peace, and to bapak Mochamad Salim, thank you for your support. To my brother Rachmat Basuki & Dina Fauzia, thank you for the entertaining conversations. And to Radriyanti Seliyaningsih, Sigit Widodo, Raymondria, and Pray, thank you so much.

And to you, reading this thesis, thank you!

Frita Yulianti